COMPARATIVE STUDY OF TWO DIFFERENT CIRCUIT TRAINING PROGRAMS ON SELECTED PHYSICAL, PHYSIOLOGICAL AND ANTHROPOMETRIC VARIABLES ON MALE BASKETBALL PLAYERS

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CHAPTER -I

Introduction

The world's most popular indoor sport, basketball, was created over 110 years ago by a Canadian educator who was teaching physical education at the YMCA's international coaching school. He created the game to provide an alternative to all the callisthenics exercises and drills, and in 1936 it was included in athletic competition. Today, basketball is arguably one of the most popular sports in Berlin. Sports professionals and their researchers have made the industry exceedingly competitive and nature-focused. Nowadays, every sport is utilised in a very specialised and highly organised way. Organising and preparing for a variety of international events is planned years in advance. Since Baron Pierre De Coubertin revived the Olympic Games in 1896, play has become extremely competitive with a nominative structure, and there is increasing evidence of interest in international cooperation in games and sports. Coaching has also become extremely scientific, involving the use of methodology and physical investigation. Since its inception in 1881 at the school for Christian employees by Dr. Educator with the only intention of engaging college students in their leisure time to provide some kind of amusement, competition, and fitness, basketball has undergone astonishing progress.

The development of training techniques has greatly raised the level of games and sports. Basketball players must possess a variety of physical skills, including speed, power, strength, agility, endurance, skill, flexibility, and tactical awareness, in order to succeed. Basketball regulations are constantly changed to speed up play and provide more excitement. Basketball players need to go through specialised training to improve the physical skills needed for brief bursts of explosive action, such as running, leaping, grabbing rebounds, and making rapid passes. The game has become quicker and more forceful as a result of recent rule modifications,

placing additional stress on the aerobic and anaerobic pathways. About 20% of the action in basketball is aerobic, whereas 80% is anaerobic.

Basketball:

It seems like you provided a text containing information about basketball, its history, popularity, and the lack of research on preparation and coaching in the sport. The text also discusses the complexity of quantifying the important components of team sports and touches upon the evolution of basketball, including the changes in equipment and rules over the years. Basketball is indeed a widely popular sport with a massive global following, involving millions of registered participants from various national federations. The financial value of basketball, particularly in professional leagues like the NBA, is significant, with substantial salaries paid to players. The sport holds great importance for national and local pride, and winning can lead to both monetary rewards and social recognition.

While there is a lack of research in team sports like basketball, the text suggests that the complexity of quantifying essential aspects of these sports is one of the reasons behind this issue. However, the precise factors contributing to the excellence of basketball players and teams, such as physical, physiological, and mental variables, have been the subject of various studies and have contributed significantly to the development of the sport. The text also briefly mentions the history of basketball, its introduction to international competitions, and the differences between U.S. and international rules and court dimensions. It highlights the United States' dominance in basketball, especially during the 1992 Olympics when the "Dream Team" composed of top professional players won the gold medal. Furthermore, the text explains the basic rules and objectives of basketball, emphasizing the importance of footwork, body balance, and various tactical elements in the game. It mentions that effective application of tactics depends on understanding the team's strengths and weaknesses and adapting to the specific match conditions. In conclusion, basketball is a globally renowned

sport with a rich history and a substantial financial impact. While research on coaching and preparation in basketball may be limited, there is a wealth of knowledge on various aspects of the game, including physical and mental attributes that contribute to success. The sport continues to evolve, and tactics play a crucial role in achieving success on the court.

FIBA:

The Federation International de Basketball Association, currently known as the International Basketball Federation, eliminated the term "novice" from its name in 1989 while keeping the acronym. As the game's regulatory organisation, FIBA is in charge of drafting the rules, providing necessary facilities and processes, organising international events, managing athlete transfers between nations, and supervising the selection of international referees. The FIBA organises a number of international basketball competitions for both men and women, including the World Championship and the Olympics. Although they were contested in the same year until 2014, the format of these competitions is identical to that of FIFA's World Cup in football. The FIBA Women's Basketball World Cup is held every four years, however in the past it took place in the same year as the men's competition, but in a different nation. The Basketball World Cup will now be held the year following the FIFA World Cup starting in 2019.

Basketball in India:

It's great to see that basketball has gained popularity in India since its inception in the 1930s. The sport is now widely played in schools, colleges, universities, and various other institutions. The Basketball Federation of India and several national and state-level associations have been instrumental in popularizing the game and developing infrastructure for it across the country.

Despite the growth of basketball in India, there are some challenges that the sport faces. The quality of Indian basketball teams is not yet comparable to

some of the stronger Asian countries, let alone Europe and America. One of the reasons for this disparity could be the lack of indoor facilities for training and playing, as basketball is primarily played as an outdoor sport in India. Countries like Singapore and Malaysia, for instance, have invested in indoor facilities that may contribute to their higher level of play.

To improve the performance of Indian basketball teams at the senior level, there is a need to focus on effective coaching and talent development from a young age. Training should be based on scientific principles and systematically designed to enhance both mental and physical capabilities, enabling athletes to deliver outstanding performances.

Basketball is a fast-paced game that calls for a combination of offensive and defensive skills. Coaches should incorporate various physical exercises and training programs to develop the necessary attributes for high-performance play. By enhancing coaching methods and providing suitable training opportunities, Indian basketball can aspire to achieve better results in Asian and international competitions, not just at the senior level but also at the junior level. This improvement at the grassroots level will eventually lead to better performances in the future.

STATEMENT OF THE PROBLEM

The title of the study is hereby stated as "Comparative Study of Two Different Circuit Training Programs on Selected Physical, Physiological and Anthropometric Variables on Male Basketball Players"

OBJECTIVES OF THE STUDY

1. To compare the effect of circuit training programs on muscular endurance
2. To compare the effect of circuit training programs on explosive strength.
3. To compare the effect of circuit training programs on flexibility.
4. To compare the effect of circuit training programs on agility.
5. To compare the effect of circuit training programs on BMI.

6. To compare the effect of circuit training programs on body fat.
7. To compare and find out the effect of circuit training 1and circuit training programs on resting heart rate.
8. To compare the effect of circuit training programs on anthropometric.(Arm girth, forearm girth, abdominal girth, chest girth, thigh girth and calf girth) .

DELIMITATIONS OF THE STUDY

1. The study will be delimited to 60 basketball players.

2. The study will be restricted to those aged 18 to 26.
3. This study will also be restricted to training programmes lasting 12 weeks.
4. The test instruments are further narrowed down to a timer and a heart rate monitor.
5. This study will also be restricted to dormitory students.
6. This study is further restricted to the physiological factors listed below.

    a. Resting heart rate

    b. BMI

7. The study is further restricted to the physical factors listed below.

    a. Agility

    b. Flexibility

    c. Muscular endurance

    d. Explosive strength

8. The study delimited to male basketball players group only.

9. The study delimited to anthropometric measurement [girth measurement of arm, forearms, chest, thigh, calf, and abdomen.]

LIMITATIONS OF THE STUDY

This study will be limited the following aspects and these limitations were taken into considerations.

1. Certain aspects, such as nutrition, daily routine, lifestyle, and habits, among others, may have an impact on the study's outcome.

2. It was impossible to control. As a result, no attempts were made to regulate these variables. However, it was considered that the random selection of patients ensured that these characteristics had no influence.
3. The study's limitations were judged to be activities other than the students' training programme.
4. The differences that may occur in performance due to hereditary factors of the athletics players were recognized as one of the limitations to the study.
5. Any external force due to which subjects getting strength we're not taken into consideration

HYPOTHESIS OF THE STUDY

On the basis of literature review, available research findings, expert's guidance and scholar's own understanding of the problem, the following hypotheses were formulated:

1. It is hypothesised that there would be a substantial difference in muscular endurance between the circuit training 1 and circuit training 2 programmes for basketball players.
2. It is hypothesised that there would be a substantial difference in explosive strength between the circuit training 1 and circuit training 2 programmes for basketball players.
3. It is hypothesised that there would be a substantial difference in flexibility between the circuit training 1 and circuit training 2 programmes for basketball players.
4. It is hypothesised that there would be a substantial difference in agility between the circuit training 1 and circuit training 2 programmes for basketball players.
5. It is hypothesised that there would be a substantial difference in BMI between the Circuit Training 1 and Circuit Training 2 programmes for basketball players.

6. It is hypothesised that basketball players will have a substantial difference in fat percentage between the circuit training 1 and circuit training 2 programmes.
7. It is hypothesised that there would be a substantial variation in resting heart rate between the basketball players' circuit training 1 and circuit training 2 programmes.
8. It is hypothesised that there will be a considerable difference in the impacts of basketball players' circuit training programmes on their anthropometric (arm girth, forearm girth, stomach girth, chest girth, thigh girth, and calf girth).

DEFINITION AND EXPLANATION OF THE TERMS

Circuit Training:

High-intensity interval training, strength training, high-intensity aerobics, and endurance training are all included in the body conditioning technique known as "circuit training." One of the objectives is to becoming stronger and more physically resilient.

Agility:

Agility is the ability to rapidly change direction and move quickly

Explosive Strength:

Explosive strength is highly specific motor ability

Muscular Endurance:

Muscular endurance is the ability of muscles to apply force against resistance repeatedly**.**

Flexibility:

Flexibility is ability to execute movements with greater amplitude or range.

Resting Heart Rate:

The lowest amount of heartbeats needed to keep the body functioning when at rest is known as the resting heart rate.

SIGNIFICANCE OF THE STUDY

The present study may be of significance in the following ways

1. The comparison between circuit training 1 and circuit training 2 on certain physiological variables among basketball players may disclose numerous significant facts.
2. The study may also inform the participants about the numerous benefits of circuit training workouts for enhancing various physical components.
3. The current study will assist in recommending various circuit training methods for forming physiological training variables among basketball players in those regions where the subject's performance is regarded as lacking.
4. To offer basketball players a successful training regimen that focuses on the development of muscular endurance.
5. It may include a description of circuit training 1 and circuit training 2, as well as indicate how the two are related.

CHAPTER–2

REVIEW OF RELATED LITERATURE

KV Shejin, T Vivekanandhan, (2020)

It appears that The purpose of this study was to look at how circuit training affected obesity (% body fat), vigor, and versatility in overweight boys aged 10-14 years from Chinmaya Vidyalaya, Kolazhy, Thrissur, Kerala. The study involved a total of thirty overweight and obese boys, selected randomly based on their BMI scores, with BMI greater than 26. These The control group and the experimental group, each with 15 individuals, were split up into groups of the subjects. The control group received no special treatment, whereas the experimental group performed circuit training for 12 weeks, three days per week. To assess the impact of the 12-week circuit training programme, data were gathered both before and after. To ascertain the significance of the training effect between the two groups, paired t-tests were done as part of the statistical analysis using the SPSS programme. According to the results, the circuit training program had a significant positive impact on the measured variables (obesity, vigor, and versatility) compared to the control group, in the experimental group. Alternatively put, the circuit training application was found to be effective in improving these aspects in overweight boys. However, without access to the specific data and detailed results, it's challenging to provide a more in-depth analysis or draw definitive conclusions from the study. The statement provided only offers a general overview of the study's purpose, design, and positive findings. A more comprehensive research paper would be needed to assess the study's methodology, limitations, and the strength of its conclusions.

Gaganpreet Kaur and Jogiswar Goswami (2019)

Based on the provided information, it seems that A research was done to look into how a circuit training programme affected the cardio capability, speed, and explosive power performance of school children in an urban center. The study included two groups, a control group that did not receive any therapy and an experimental group that participated in the circuit training programme. Each group consisted of 40 children with an age range of 16±2 years.Participants: 40

children were selected for each group, with age criteria specified (16±2 years).Pre-data collection: Before the training program began, data on the established variables (cardio capability, speed, and explosive power performance) were collected from both the experimental and control groups. Intervention: The circuit training program was implemented with the experimental group over a period of twelve weeks, involving four days of training each week.Post-data collection: After the twelve-week training period, data on the established variables were collected again from both the experimental and control groups. Statistical analysis: To analyze the data, the researcher applied tests that checked the assumptions of analysis of variance (ANOVA). ANCOVA: The effect of ANCOVA (analysis of covariance) was used to assess the impact of the training program on the established variables (cardio capability, speed, and explosive power performance).Results: The analysis revealed the training course had a substantial impact on the established variables, and it was found to be effective. However, specific details about the statistical tests used, the magnitude of the effect, and any potential limitations or further interpretations are not provided in the given information. Additionally, it would be helpful to know the specific variables measured, the training program's content, and how the data was analyzed with ANCOVA. As a final note, while the information gives an overview of the study, it lacks specific details and context necessary for a comprehensive assessment. In any scientific study, it's essential to consider the study design, methodology, statistical analysis, and other factors to properly interpret the results and draw meaningful conclusions.

Michal Lehnert, Petr Stastny & et al (2015)

The grant study's goal was to look into how circuit training may affect adiposity (% body fat), vitality, and versatility among overweight male and female students aged 10-14 years attending Chinmaya Vidyalaya, Kolazhy, Thrissur, Kerala. The study involved a total of thirty overweight and obese boys who were selected randomly based mainly on their BMI scores, with BMI

greater than 26. These thirty The experimental group and the control group were then split up into thirty participants. Each group had 15 participants.The experimentation squad participated in a 12-week circuit training program, which took place three days a week. On the other hand, the control group did not receive any additional treatment or intervention and acted as a comparison to assess the effects of the circuit training program.Data collected during the study were analyzed using the SPSS statistical package. Paired t-tests were performed to determine the significant effect of the circuit training program between the experimental and control groups.The results of the study indicated that the circuit training program had a significant impact on the measured variables, which were adiposity (% body fat), vitality, and versatility. This means that the 12-week circuit training program was found to be effective in improving these aspects in overweight male and female students aged 10-14 years from Chinmaya Vidyalaya, Kolazhy, Thrissur, Kerala.However, without access to the specific data and detailed findings of the study, it is not possible to provide further insights into the magnitude of the effects or specific details of the results. Moreover, the study's scientific significance would depend on factors such as the methodology, sample size, and rigor of the statistical analysis.

Montgomery *et al.*, (2010)

The core objective this research was to analyze the distinct physical and physiological effects demonstrated by men's basketball players across a spectrum of practice drills and real-game scenarios. A cohort of 11 male basketball players, with average age, height, and weight of 19.1 years, 1.91 meters, and 87.9 kilograms respectively, participated in offensive and defensive drills as well as competitive matches. By collecting and normalizing metrics like heart rate, oxygen consumption (VO2), and triaxial accelerometer data, the study illuminated the contrasting demands of practice drills and games. The utilization of log-transformed data and effect size (ES) statistics underscored the discrepancies, highlighting the markedly elevated physical load and oxygen consumption during actual game play. Notably,

the integration of accelerometers and heart rate monitoring as evaluative tools holds immense promise for coaches and trainers, furnishing invaluable insights into the rigor and necessities of different basketball activities. Ultimately, these findings empower the optimization of training strategies to elevate player performance.

Hamdy Kassem (2010)

The study concludes that plyometric exercises are effective in enhancing the special physical abilities and skillful performance of basketball players. The experimental group, which followed the plyometric exercise program, showed significant improvements in vertical jump, medicine ball push, running, and shuttle running tests, leading to better performance in passing, dribbling, under-basket shooting, and lay-up skills. The findings suggest which incorporates plyometric exercises into the training regimen of basketball players can positively impact their athletic performance and overall skill level on the court.

CHAPTER-3

METHODOLOGY

This chapter includes descriptions of the subject selection, variable selection, criteria measures, data reliability, instrument reliability, tester competency, data collection, and statistical analysis of the data.

SELECTION OF SUBJECTS

It seems like it might be used to describe the research methodology for a study involving 60 basketball players from Madhya Pradesh, India. The participants will range in age from 18 to 26. The 60 players will be split into three equal groups for the study: two experimental groups and one control group, each with 20 participants. Groups 1 and 2 will get the experimental circuit training, while the control group will not receive any additional training. The lottery technique will be used to randomly choose the participants for each category.

SELECTION OF VARIABLES

The research researcher looked over all of the relevant scientific material, including books, journals, magazines, websites, and research papers, and found that circuit training was crucial. The following variables and tests were chosen for this study while considering feasibility, criteria, and instrument availability.

Dependent Variables:

Physical Variable

I. Muscular endurance
II. Explosive strength
III. Flexibility
IV. Agility

Physiological variable

I. Body mass index
II. Percent body fat
III. Resting heart rate

Anthropometric variable

I. Arm girth

II. Forearm girth

III. Abdominal girth

IV. Chest girth

V. Thigh girth

VI. Calf girth

Independent Variables

I. Group I –Circuit training

II. Group II – Circuit training

III. Group III – Control Group

CRITERION MEASURES

Physical Variables:

S.N.	Variables	Test/Equipment Needed	Unit of Measurements
1	Muscular Endurance	Sit-ups	Number
2	Explosive Strength	Vertical jump	Centimetres
3	Flexibility	Sit & reach test	Centimetres
4	Agility	Shuttle run	Time

Physiological Variables:

S.N.	Variables	Test/Equipment Needed	Unit of Measurements
1	BMI	BMI = weight in kg / height in meter2	Scores
2	Percent Body fat	Skin fold calliper	Mm
3	Resting Heart Rate	Stopwatch	Heartbeat /minute

Anthropometrical Variables:

S.N.	Variables	Test/Equipment Needed	Unit of Measurements
1	Arm girth	Anthropometric Tape	Centimetres
2	Forearm girth	Anthropometric	Centimetres

		Tape	
3	Chest girth	Anthropometric Tape	Centimetres
4	Abdominal girth	Anthropometric Tape	Centimetres
5	Thigh girth	Anthropometric Tape	Centimetres
6	Calf girth	Anthropometric Tape	Centimetres

RELIABILITY OF DATA

The reliability of the data will be ensured by establishing the scale, questionnaire, inventory and instrument reliability psychological and physiological components measurement technique.

INSTRUMENT RELIABILITY

The study's instruments will be purchased from reputable companies that provide for the requirements of several research facilities in India and overseas, and their calibration will be acknowledged as precise enough for this study's purposes.

TESTERS COMPETENCY

Test-retest method will be employed by conducting the measurements on 10 subjects on two different days before taking the final measurements on all the subjects. The coefficients of correlation will be found out to check tester’s competency.

SELECTION OF SUBJECTS

It seems like it might be used to describe the research methodology for a study involving 60 basketball players from Madhya Pradesh, India. The participants will range in age from 18 to 26. The 60 players will be split into three equal groups for the study: two experimental groups and one control group, each with 20 participants. Groups 1 and 2 will get the experimental circuit training, while the control group will not receive any additional training.

The lottery technique will be used to randomly choose the participants for each category.

STATISTICAL TECHNIQUE

When testing the main and interaction effects of categorical factors on a continuous dependent variable, analysis of covariance (ANCOVA) is employed to account for the effects of a few additional continuous variables that co-variate with the dependent.

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